Community Recommendation Workbook

Choosing Acceptable Options

The Cleanup Trail

JAG
JOINT ACTION GROUP

For Environmental Clean-Up Of The Muggah Creek Watershed

Message from Dan Fraser, Joint Action Group Chair

Dear Fellow Citizens:

Our community is at a turning point. Over the next three months, we have an opportunity to recommend acceptable solutions to the environmental problems that have plagued us for decades. Governments have demonstrated their commitment to The Big Cleanup. Your participation will strengthen our recommendation.

The groundwork is done. Scientists and engineers have presented us with six options for cleaning up the Tar Ponds and four options for cleaning up the Coke Ovens site.

We need the community's assessment of these options. Which options are acceptable to the community? Which are not? What modifications would improve them?

The Joint Action Group (JAG) will weigh the community's views according to four of our core principles: health conscious, environmentally sound, economically responsible, and socially acceptable. In May, JAG will use the results to draft a recommendation to government on acceptable cleanup options.

Thank you for taking part in this historic process.

Sincerely yours,

Dan Fraser, JAG Chair
February 2003

The Path to Tar Ponds & Coke Ovens Cleanup

Setting Directions

Community input through JAG helps set criteria for cleanup.

Summer 2002

Detailed Understanding

Environmental science precisely defines the problems and risks.

Fall 2002

Considering Technologies

Cleanup technologies are compared to determine which is best for us.

Summer 2002

Short List of Options

Technical experts present a short list of options to JAG and the community.

24 February, 2003

Community Recommendation

JAG seeks community input on the Short List of Options before advising the government of its preferred solution(s).

February - May 2003

Government Approval

Process starts Summer 2003.

Leads to tender of contracts.

Winter 2004 - 2005

Community Workbook Participant

We would like to give people in all areas and age groups of the Cape Breton Regional Municipality a chance to participate. Please complete the following questions.

Name: (optional) _____ Date: _____

Civic Address: _____

Postal Code: _____ Phone: # (optional) _____

Fax: # (optional) _____ E-mail: (optional) _____

Name of organization(s) that you belong to: _____

Age Group: Please check the correct response:

- ☐ Under 25 years
- ☐ 25-44 years
- ☐ 45-64 years
- ☐ 65 years or older

We will publish a report detailing the findings of these workbooks on the JAG website www.muggah.org by May 2003.

Would you like to receive a printed copy of the final report?

☐ Yes ☐ No

Mailing Address (if different than above):

_____

_____

_____

Postal Code: _____

Introduction

The Remedial Action Evaluation Report (RAER) identifies six cleanup options for the Tar Ponds and four options for the Coke Ovens site. The purpose of this workbook is to gather community views on these options.

In this workbook you will learn how the Short List of Options was created; how well each option scores against the Community Evaluation Criteria compiled from JAG's Setting Directions process last spring; a list of activities and processes that are "givens" for every option; and finally, the options themselves.

Please note: In this workbook, we use the word cleanup to mean remediation. Remediation can include the removal, destruction, containment, isolation, treatment, or monitoring of hazardous substances.

There are several ways you, or your organization, can provide your views.

1. **Internet:** You can complete the workbook online at the JAG website: www.muggah.org. Click on the public participation tab located on the right of the screen.

2. **Workshop/Meeting:** You can call Bev at JAG at 563-5584 to set up a meeting for your community group or organization. An independent facilitator and a technical expert will guide the group through the workbook session that typically lasts two hours.

3. **Open Houses:** JAG will hold three to four Open Houses. Open Houses are scheduled during Saturday afternoons, with information and technical experts available. A facilitator will moderate discussions in one section of the room. We will provide childcare services on-site. If you need a ride to an Open House, call us at 563-5584.

4. **Neighbourhood coffee breaks:** JAG encourages small meetings in neighbourhoods, usually at a person's home, for friends and neighbours to attend. Call JAG if you would like to host a coffee break. We supply tea, coffee, snacks, workbooks, a facilitator, and a technical expert.

5. **Pick Up:** You can find more copies of this workbook at public libraries, UCCB library, and at the JAG office on the 3rd Floor of the Civic Centre in Sydney. You can mail, fax, e-mail, or drop off your completed workbook (only one per participant will be accepted). Our address is: Joint Action Group, 320 Esplanade, Sydney, Nova Scotia, B1P 7B9. Fax: 563-5240. E-mail: damurphy@CBRM.ns.ca

How the Short List of Options was Created

Contaminated sites like the Sydney Tar Ponds and Coke Ovens exist all over the world. During the last 30 years, many have been successfully cleaned up. Those cleanups produced knowledge Sydney can use.

The Joint Action Group (JAG) asked governments to fund a detailed evaluation of proven cleanup methods.

In response, technical experts carried out an intensive investigation into the types, amounts, and locations of contaminants to be treated. They collected information on cleanup technologies used successfully at contaminated sites similar to ours. They put a variety of technologies through test runs with Tar Ponds sediments. Scientists conducted risk assessments to establish cleanup targets that will protect people and animals on this site.

In the Spring of 2002, JAG sought community input on the development of Evaluation Criteria; what values The Big Cleanup should reflect. The public ranked 12 different criteria according to how important those criteria were to them. JAG sent those results to the technical consultants who considered those values while creating their Short List of Cleanup Options.

Community Evaluation Criteria

In the spring of 2002, JAG went to the community with its Setting Directions process. 600 people throughout the Cape Breton Regional Municipality took part. They ranked 12 different criteria according to how important those criteria were to them. Those rankings are indicated as High, Medium, or Low.

The technical consultants considered those values while creating the Short List.

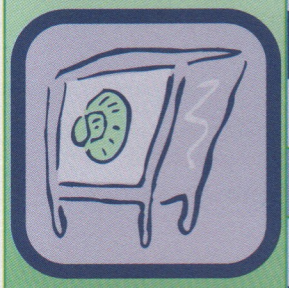
You can see for yourself how the consultants ranked each option against the community evaluation criteria. They used a grading system like you would see on a school report card. Lots of A's and B's means the option ranks exceptionally well with the community evaluation criteria. Lots of D's and E's means it doesn't.

The individual criteria results for each option will appear later in the Workbook, alongside the options themselves. The matrix presented here shows all the results for comparison purposes.

You can see how each option rated against the various criteria by going down the columns.

You can see how the various options compare with each other for a given criteria by going across the rows.

A	Expected to greatly exceed the Community Evaluation Criteria
B	Expected to exceed the Community Evaluation Criteria
C	Expected to completely meet the Community Evaluation Criteria
D	Expected to mostly meet the Community Evaluation Criteria
E	Expected to partially meet the Community Evaluation Criteria



		Tar Ponds Options						Coke Oven Options				
		Excavation of North Pond Containment in South Pond	Excavation of both ponds Containment at Coke Ovens Site	Soil washing, Bioremediation, Co-burning and Containment	Co-Burning	Onsite Incineration	Containment and Capping of Both Ponds		Bioremediation and Containment	Containment	Soil washing and Co-burning	Pyrolysis and Co-burning
Criteria	**Weights**	**1**	**2**	**3**	**4**	**5**	**6**	**Weights**	**1**	**2**	**3**	**4**
Environmentally Sound												
Reduce Detrimental Effect on the Environment	**Medium**	**B**	**B**	**C**	**C**	**C**	**B**	**Medium**	**A**	**B**	**B**	**B**
Enhance Long Term Effectiveness	**Medium**	**B**	**B**	**A**	**A**	**A**	**C**	**Medium**	**C**	**B**	**A**	**A**
Improve Land and Marine Ecosystem	**Medium**	**B**	**B**	**B**	**A**	**B**	**C**	**Medium**	**A**	**A**	**A**	**A**
Economically Responsible												
More Reliable Technology	**High**	**B**	**B**	**B**	**C**	**B**	**C**	**High**	**B**	**A**	**B**	**A**
Cost Effectiveness	**Low**	**B**	**B**	**C**	**C**	**C**	**B**	**Low**	**B**	**A**	**C**	**B**
Use of Local Materials	**Low**	**B**	**B**	**C**	**E**	**D**	**A**	**Low**	**B**	**A**	**C**	**C**
Health Conscious												
Minimize Health Risk	**High**	**B**	**B**	**A**	**A**	**A**	**B**	**High**	**B**	**B**	**A**	**A**
Minimize Amount of Dust and Vapours	**Medium**	**B**	**C**	**C**	**C**	**C**	**B**	**Medium**	**B**	**C**	**C**	**C**
Minimize Odours	**Low**	**B**	**C**	**C**	**C**	**C**	**B**	**Low**	**A**	**C**	**C**	**C**
Socially Acceptable												
Maximize Long Term Benefits	**High**	**C**	**B**	**B**	**A**	**B**	**D**	**High**	**C**	**B**	**A**	**A**
Use of Local Labour	**Medium**	**B**	**B**	**C**	**C**	**C**	**B**	**Medium**	**B**	**A**	**B**	**B**
Minimize Construction and Cleanup Time	**Low**	**A**	**A**	**C**	**C**	**C**	**A**	**Low**	**B**	**B**	**B**	**C**

Meeting Expectations

The Joint Action Group's Core Principles require The Big Cleanup to be environmentally sound, economically responsible, health conscious, and socially acceptable.

There's a lot to clean up – and we don't want any surprises. So technical experts took thousands of samples and measurements to determine the nature and location of contaminants on the site.

On complex sites like ours, the Canadian Council for Ministers of the Environment [CCME] recommends that scientists use that detailed information to assess the specific risks to people and animals. Technical experts carried out such a Risk Assessment to establish cleanup targets that reflect actual conditions here.

Their Risk Assessment tells us three things: The Source (where contaminants are, and their concentrations); The Pathway (how contaminants move away from the Source), and The Receptors (people and animals at the end of the Pathway).

The options presented here use various techniques, but they all deal with the problem by eliminating the Source (removing or destroying contaminants), blocking the Pathways (constructing a containment system), or both. In every case, the goal is the same: make the sites safe for people and animals.

The community asked for proven solutions. All the solutions presented here have proven safe, reliable, practical, and effective on similar sites. They are not experimental. They will let us get on with the job.

As always, strict environmental controls will govern all cleanup work.

How JAG will use this community input

An independent data analyst will compile the information from the workbooks. In May, JAG will publish a report of the workbooks' findings. The report will show the percentages of participants who accepted, accepted with certain modifications, or did not accept each option. It will also highlight the reasons behind the choices and potential modifications for improving each option.

The data analyst will then describe modified options based on your answers. JAG's Remedial Options Working Group (ROWG) will review this material and weigh all options against JAG's core principles.

Making a Decision: ROWG will use a consensus process, defined in JAG's by-laws, to develop and recommend the wording for a motion describing the cleanup options that are acceptable to the community. That motion will go to JAG's Steering Committee for further consideration. The Steering Committee will then pass the motion to JAG Roundtable for a final vote.

The motion passed at JAG Roundtable in May 2003 will be the official Community Recommendation to government for the cleanup of the Tar Ponds and Coke Ovens.

That Community Recommendation starts right here with this Workbook.

Considering the Options

The next section of the workbook describes each cleanup option. The descriptions will include environmental ratings, health ratings, costs, duration of the cleanup starting from the moment the first shovel goes into the ground, reliability, and permanence.

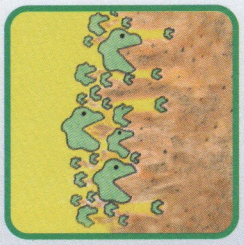
With each option, you will have the opportunity to tell us whether the option is acceptable, acceptable with certain modifications, or unacceptable to you. In each case, there is a space to tell us why you chose the answer you did.

Excavation of North Pond, Containment in South Pond

This option would excavate sediment from the North Pond and place it in a bermed containment area to be built in the South Pond. When completed, the containment facility would be fitted with an engineered cap and planted with grass. The North Pond would once again become a healthy aquatic environment. PCB material would go to an offsite incinerator approved for PCB destruction.

In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

Cost	Duration	Notes	Risk Management
$160-million	4 Years	**Advantages:** Makes good use of local labour and materials; removes contaminants from North Pond; destroys PCBs; makes the North Pond a healthy aquatic environment. **Limitations:** Does not eliminate all contaminants; containment area requires continued monitoring & maintenance; may generate dust, vapours and odours during cleanup requiring mitigation measures.	Blocks pathways and eliminates some sources



Bioremediation
Bioremediation uses tiny organisms to digest contaminants and turn them into water and gasses like carbon dioxide. In some cases the process can be can be aided with heat and nutrients.

Capping & Containment
Capping and Containment involve placing a barrier around contaminated material. This prevents direct contact with the contaminants, and prevents contaminants from leaving through groundwater or air.

Co-Burning
Hydrocarbon wastes are used to supplement a fuel such as coal to produce energy. The blended fuel can be burned using technology similar to that used for the original fuel source. The exhaust material passes through filters and scrubbers for pollution control.

Excavation
Excavation is the mechanical removal of contaminated soils and sediment using machines like backhoes and dredges. Excavation includes other activities like active dewatering, decanting, and bulk material transportation.

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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	B
Enhance Long Term Effectiveness and Permanence	B
Improve Land and Marine Ecosystem	B
Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	B
Use of Local Materials	B
Health Conscious	
Minimize Health Risk	B
Minimize Amount of Dust and Vapours	B
Minimize Odours	B
Socially Acceptable	
Maximize Long Term Benefits	C
Use of Local Labour	B
Minimize Construction and Cleanup Time	A

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

☐ **Acceptable with certain modifications.**
What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

1	2	3
I narrowly accept it		I strongly accept it.

OR

☐ **Not Acceptable.** Please explain why?

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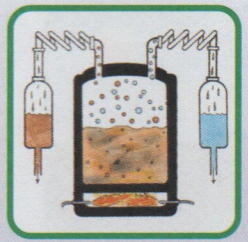
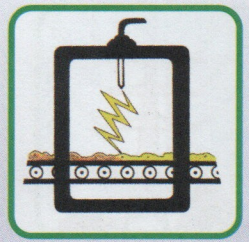
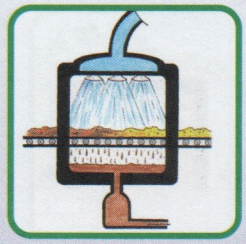


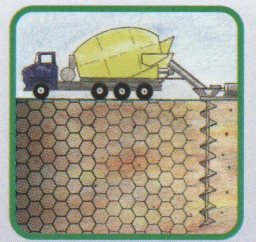
Other Thermal Treatments
Thermal desorption, pyrolysis, and hydrogen reduction all bake soil and sediment to separate contaminants from the original material. The vapour contaminants are then treated with pressure or chemicals to make them less volatile.



Plasma
Extreme heat [10,000 degrees Celsius] converts organic compounds into recoverable gasses. At these temperatures, sand sediments transform into glass. Metals fuse to the glass permanently, so they can't move.



Soil Washing
Soil washing uses water and cleaning agents to dislodge chemicals stuck to particles of sand and gravel and reduces the volume of material that requires further treatment.



Stabilization & Solidification
Stabilization and solidification slows or stops the movement of contaminants. It is common to use a cement like additive to make the substance solid or less mobile.

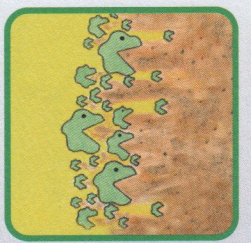
Tar Ponds

Excavation of both ponds, Containment at Coke Ovens site

This option would excavate the sediment from both ponds, solidify it, and place it in an engineered containment facility at the Coke Ovens site. PCB material would go to an offsite incinerator approved for PCB destruction.

In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

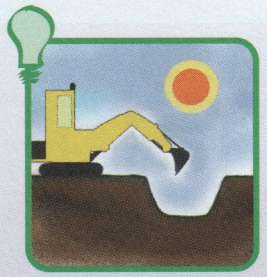
Cost	Duration	Notes	Risk Management
$250-million	4 Years	**Advantages:** Makes good use of local labour and materials; destroys PCBs; removes contaminants from ponds; makes both ponds healthy aquatic environments. **Limitations:** Containment area requires continued monitoring & maintenance; may generate dust, vapours and odours during cleanup requiring mitigation measures.	Blocks pathways



Bioremediation
Bioremediation uses tiny organisms to digest contaminants and turn them into water and gasses like carbon dioxide. In some cases the process can be can be aided with heat and nutrients.

Capping & Containment
Capping and Containment involve placing a barrier around contaminated material. This prevents direct contact with the contaminants, and prevents contaminants from leaving through groundwater or air.

Co-Burning
Hydrocarbon wastes are used to supplement a fuel such as coal to produce energy. The blended fuel can be burned using technology similar to that used for the original fuel source. The exhaust material passes through filters and scrubbers for pollution control.



Excavation
Excavation is the mechanical removal of contaminated soils and sediment using machines like backhoes and dredges. Excavation includes other activities like active dewatering, decanting, and bulk material transportation.

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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	B
Enhance Long Term Effectiveness and Permanence	B
Improve Land and Marine Ecosystem	B
Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	B
Use of Local Materials	B
Health Conscious	
Minimize Health Risk	B
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	B
Use of Local Labour	B
Minimize Construction and Cleanup Time	A

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

☐ **Acceptable with certain modifications.**
What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

1	2	3
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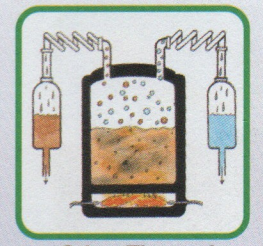

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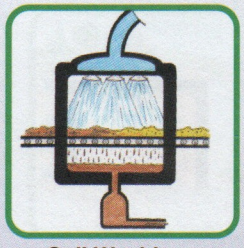

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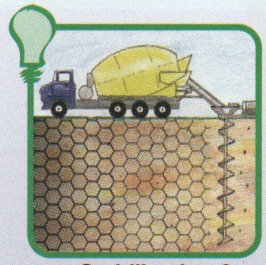

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Soil washing, Bioremediation, Co-burning, and Containment

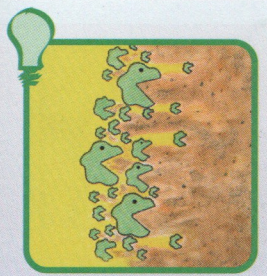
This option would excavate sediment from both ponds and treat it with soil washing and possibly bioremediation. Fuel material recovered in this manner would go to an offsite power plant or cement kiln for co-burning.

PCB materials would be treated on the site with pyrolysis or thermal desorption, then destroyed through offsite incineration, plasma, or hydrogen reduction.

In both cases the treated sediment would be sent to the Coke Ovens site and, if necessary, placed in an engineered containment facility there.

In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

Cost	Duration	Notes	Risk Management
$330-million	7 Years	**Advantages:** Destroys contaminants; makes both ponds healthy aquatic environments; recovers energy through co-burning. **Limitations:** May generate dust, vapours and odours during cleanup requiring mitigation measures; uses a complex train of technologies; requires continued management of treated materials.	Eliminates source



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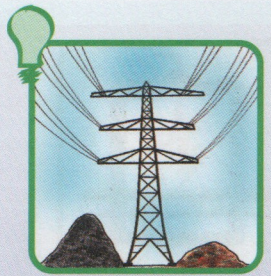

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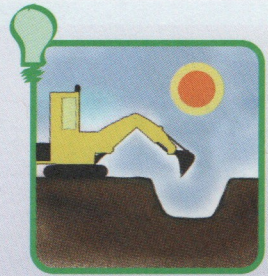

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Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	C
Use of Local Materials	C
Health Conscious	
Minimize Health Risk	A
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	B
Use of Local Labour	C
Minimize Construction and Cleanup Time	C

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

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What modification(s) would make this option acceptable?

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OR

☐ **Not Acceptable.** Please explain why?

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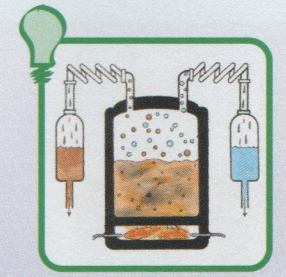

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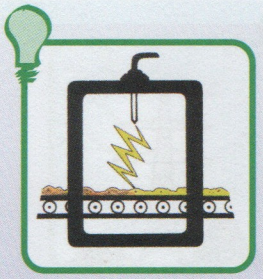

Plasma
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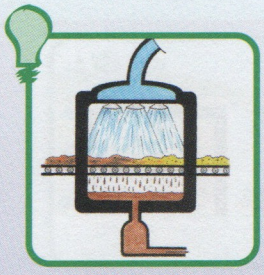
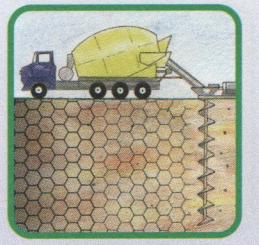


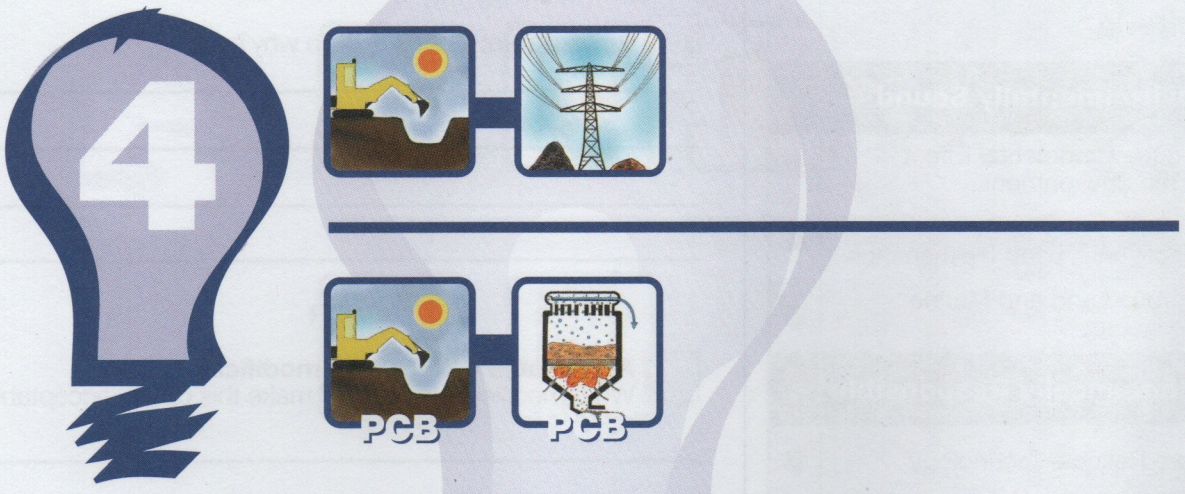
Soil Washing
Soil washing uses water and cleaning agents to dislodge chemicals stuck to particles of sand and gravel and reduces the volume of material that requires further treatment.



Stabilization & Solidification
Stabilization and solidification slows or stops the movement of contaminants. It is common to use a cement like additive to make the substance solid or less mobile.

Tar Ponds

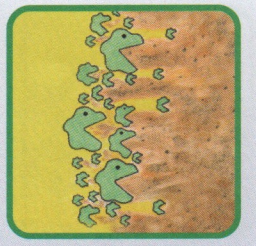
Co-burning



This option would excavate sediment from both ponds and send it to a power plant or cement kiln for co-burning. PCB material would go to an offsite incinerator approved for PCB destruction.

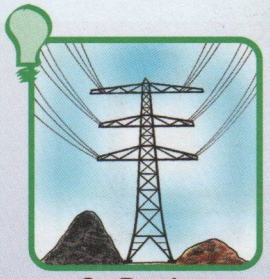
In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

Cost	Duration	Notes	Risk Management
$220-million plus transport	11 Years	**Advantages:** Destroys contaminants; makes both ponds healthy aquatic environments; recovers energy through co-burning. **Limitations:** May generate dust, vapours and odours during cleanup requiring mitigation measures.	Eliminates source



Bioremediation
Bioremediation uses tiny organisms to digest contaminants and turn them into water and gasses like carbon dioxide. In some cases the process can be can be aided with heat and nutrients.

Capping & Containment
Capping and Containment involve placing a barrier around contaminated material. This prevents direct contact with the contaminants, and prevents contaminants from leaving through groundwater or air.



Co-Burning
Hydrocarbon wastes are used to supplement a fuel such as coal to produce energy. The blended fuel can be burned using technology similar to that used for the original fuel source. The exhaust material passes through filters and scrubbers for pollution control.

Excavation
Excavation is the mechanical removal of contaminated soils and sediment using machines like backhoes and dredges. Excavation includes other activities like active dewatering, decanting, and bulk material transportation.

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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	C
Enhance Long Term Effectiveness and Permanence	A
Improve Land and Marine Ecosystem	A
Economically Responsible	
More Reliable Technology	C
Cost Effectiveness	C
Use of Local Materials	E
Health Conscious	
Minimize Health Risk	A
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	A
Use of Local Labour	C
Minimize Construction and Cleanup Time	C

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

☐ **Acceptable with certain modifications.**
What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

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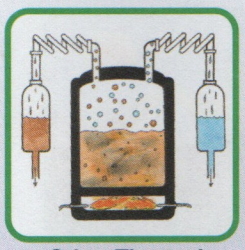

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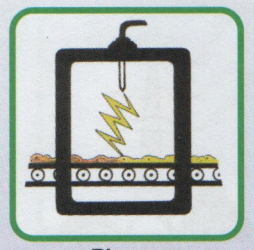

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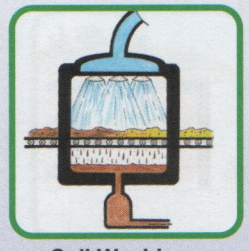

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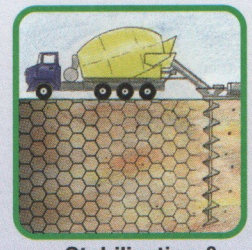

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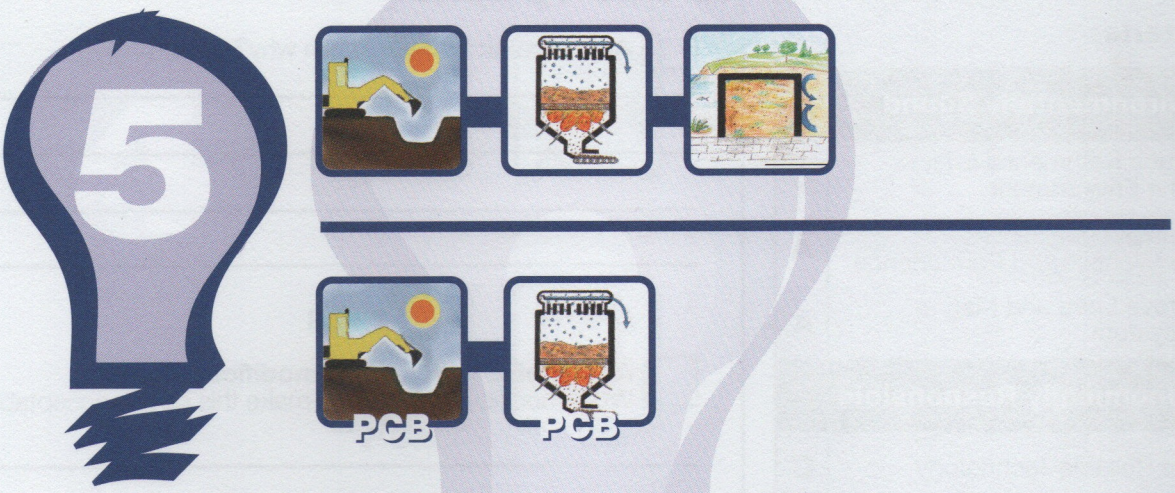
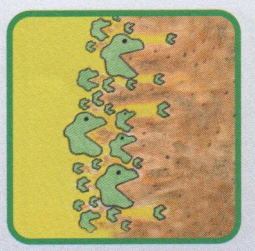
Onsite Incineration



This option would excavate sediment from both ponds and incinerate it onsite in an approved facility or facilities designed to handle PAHs and PCBs. Incinerator ash would go to an engineered landfill at the Coke Ovens.

In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

Cost	Duration	Notes	Risk Management
$240-million	11 Years	**Advantages:** Destroys contaminants; makes both ponds healthy aquatic environments. **Limitations:** May generate dust, vapours and odours during cleanup requiring mitigation measures; requires continued management of treated materials.	Eliminates source



Bioremediation
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Capping & Containment
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Co-Burning
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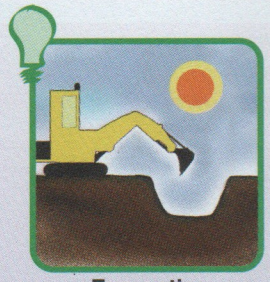

Excavation
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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	C
Enhance Long Term Effectiveness and Permanence	A
Improve Land and Marine Ecosystem	B
Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	C
Use of Local Materials	D
Health Conscious	
Minimize Health Risk	A
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	B
Use of Local Labour	C
Minimize Construction and Cleanup Time	C

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

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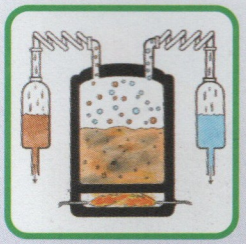

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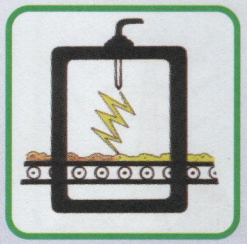

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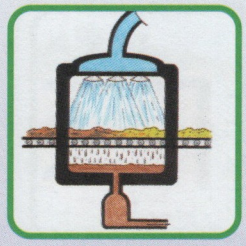

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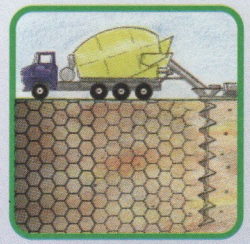

Stabilization & Solidification
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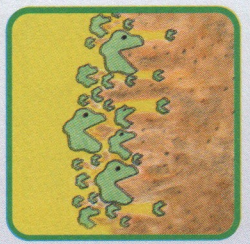
Tar Ponds

Capping and Containment of both ponds

This option would contain the sediment in both ponds under an engineered cap. Grass would cover the above-water portions of the cap (all of the South Pond and part of the North Pond).

In all six Tar Ponds options, a cofferdam at Battery Point would protect Sydney Harbour during construction, and Muggah Creek would be re-routed around the construction work.

Cost	Duration	Notes	Risk Management
$120-million	4 Years	**Advantages:** Makes good use of local labour and materials; does not disturb contaminants, has lowest potential for dust, vapours, & odours. **Limitations:** Does not eliminate contaminants; requires continued monitoring & maintenance.	Blocks pathways



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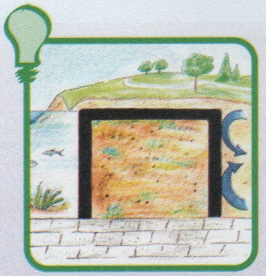

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Co-Burning
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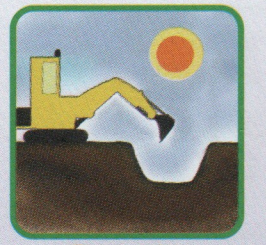

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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	B
Enhance Long Term Effectiveness and Permanence	C
Improve Land and Marine Ecosystem	C
Economically Responsible	
More Reliable Technology	C
Cost Effectiveness	B
Use of Local Materials	A
Health Conscious	
Minimize Health Risk	B
Minimize Amount of Dust and Vapours	B
Minimize Odours	B
Socially Acceptable	
Maximize Long Term Benefits	D
Use of Local Labour	B
Minimize Construction and Cleanup Time	A

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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What modification(s) would make this option acceptable?

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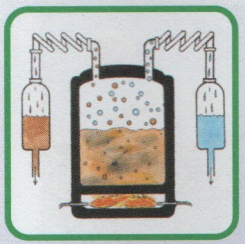

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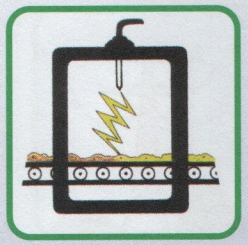

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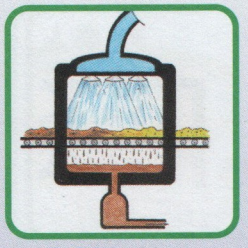

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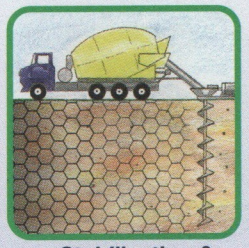

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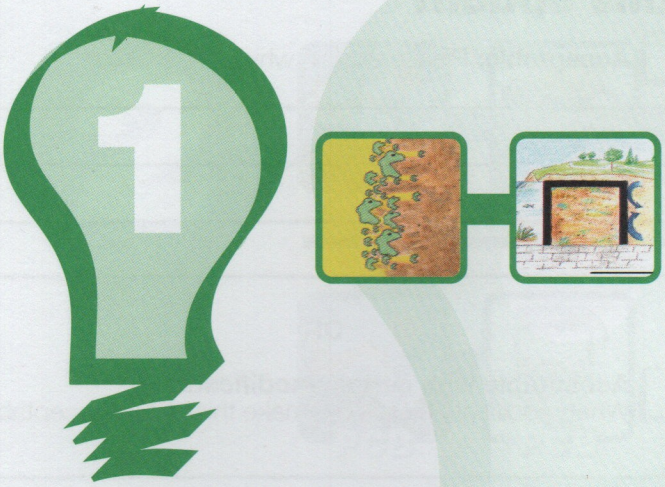
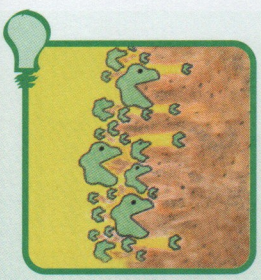
Bioremediation and Containment



This option would bioremediate PAH-contaminated surface soils, then cover the excavated area with soil and plant it with grass. Cutoff walls would prevent subsurface coal tar from intruding into the lower reaches of Coke Ovens Brook. A trench in the old streambed would collect coal tar and groundwater, with the groundwater going to a water treatment plant.

All four Coke Ovens options would re-route Coke Oven Brook through Mullin's Bank, and all could include an engineered containment area for Tar Ponds sediment.

Cost	Duration	Notes	Risk Management
$70-million	4 Years	**Advantages:** Makes good use of local labour and materials; has the lowest potential to generate dust, vapours, & odours. **Limitations:** Requires continued monitoring & maintenance; requires the highest level of engineering and health-and-safety controls for future construction and commercial activities.	Eliminates some sources and blocks pathways



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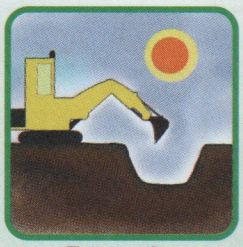

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Criteria	
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Enhance Long Term Effectiveness and Permanence	C
Improve Land and Marine Ecosystem	A
Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	B
Use of Local Materials	B
Health Conscious	
Minimize Health Risk	B
Minimize Amount of Dust and Vapours	B
Minimize Odours	A
Socially Acceptable	
Maximize Long Term Benefits	C
Use of Local Labour	B
Minimize Construction and Cleanup Time	B

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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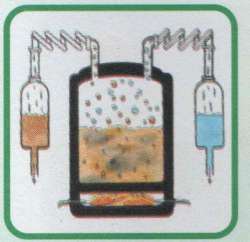

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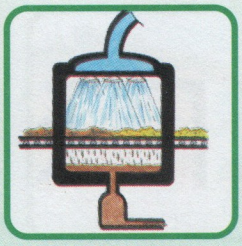

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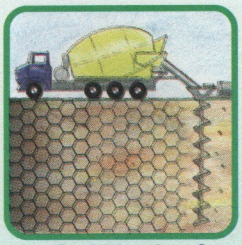


Stabilization & Solidification
Stabilization and solidification slows or stops the movement of contaminants. It is common to use a cement like additive to make the substance solid or less mobile.

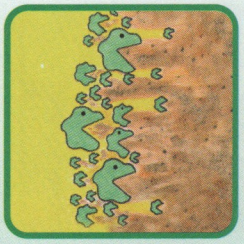
Coke Ovens

Containment

The option would excavate the top two metres of soil from contaminated areas and replace it with clean fill. The contaminated soil would go into an engineered landfill on site. Underground chambers and tunnels would be removed or filled, and the site would be covered with clean soil and planted with grass.

All four Coke Ovens options would re-route Coke Oven Brook through Mullin's Bank, and all could include an engineered containment area for Tar Ponds sediment.

Cost	Duration	Notes	Risk Management
$40-million	5 Years	**Advantages:** Makes good use of local labour and materials; contains the contaminants. **Limitations:** Containment system requires continued monitoring and maintenance; may generate dust, vapours and odours during cleanup requiring mitigation measures; requires engineering and health-and-safety controls for future construction and commercial activities.	Blocks pathways



Bioremediation
Bioremediation uses tiny organisms to digest contaminants and turn them into water and gasses like carbon dioxide. In some cases the process can be can be aided with heat and nutrients.

Capping & Containment
Capping and Containment involve placing a barrier around contaminated material. This prevents direct contact with the contaminants, and prevents contaminants from leaving through groundwater or air.

Co-Burning
Hydrocarbon wastes are used to supplement a fuel such as coal to produce energy. The blended fuel can be burned using technology similar to that used for the original fuel source. The exhaust material passes through filters and scrubbers for pollution control.

Excavation
Excavation is the mechanical removal of contaminated soils and sediment using machines like backhoes and dredges. Excavation includes other activities like active dewatering, decanting, and bulk material transportation.

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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	B
Enhance Long Term Effectiveness and Permanence	B
Improve Land and Marine Ecosystem	A
Economically Responsible	
More Reliable Technology	A
Cost Effectiveness	A
Use of Local Materials	A
Health Conscious	
Minimize Health Risk	B
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	B
Use of Local Labour	A
Minimize Construction and Cleanup Time	B

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

☐ **Acceptable with certain modifications.**
What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

1	2	3
I narrowly accept it		I strongly accept it.

OR

☐ **Not Acceptable.** Please explain why?

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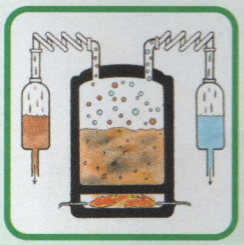
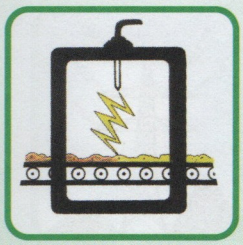


Other Thermal Treatments
Thermal desorption, pyrolysis, and hydrogen reduction all bake soil and sediment to separate contaminants from the original material. The vapour contaminants are then treated with pressure or chemicals to make them less volatile.



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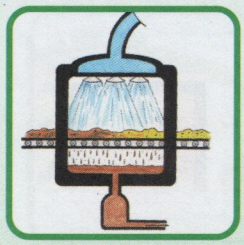
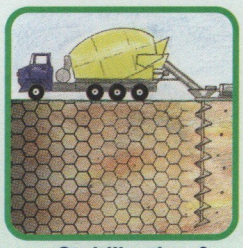
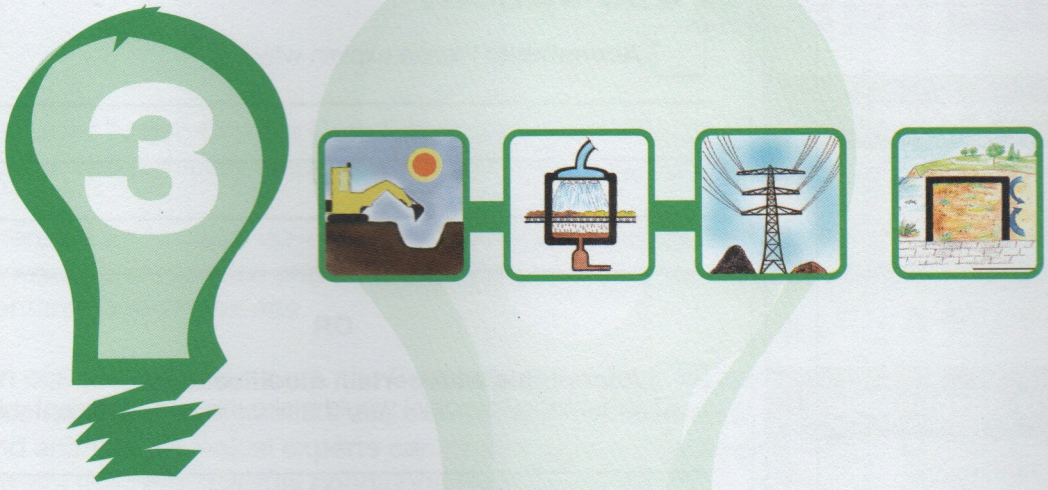


Soil Washing
Soil washing uses water and cleaning agents to dislodge chemicals stuck to particles of sand and gravel and reduces the volume of material that requires further treatment.



Stabilization & Solidification
Stabilization and solidification slows or stops the movement of contaminants. It is common to use a cement like additive to make the substance solid or less mobile.

Soil washing and Co-burning

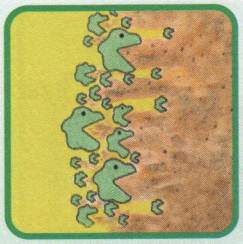


This option would excavate the top two metres of soil from contaminated areas and replace it with clean fill. Soil washing would separate contaminants from excavated soil. Fuel material recovered in this manner would be sent to an offsite power plant or cement kiln for co-burning. The remaining material would go into an engineered landfill on site.

Underground chambers and tunnels would be removed or filled, and the site would be covered with clean soil and planted with grass.

All four Coke Ovens options would re-route Coke Oven Brook through Mullin's Bank, and all could include an engineered containment area for Tar Ponds sediment.

Cost	Duration	Notes	Risk Management
$120-million	7 Years	**Advantages:** Makes good use of local labour and materials; destroys contaminants; recovers energy though co-burning. **Limitations:** May generate dust, vapours and odours during cleanup requiring mitigation measures; may require management of treated materials; requires engineering and health-and-safety controls for future construction and commercial activities.	Eliminates source



Bioremediation
Bioremediation uses tiny organisms to digest contaminants and turn them into water and gasses like carbon dioxide. In some cases the process can be can be aided with heat and nutrients.

Capping & Containment
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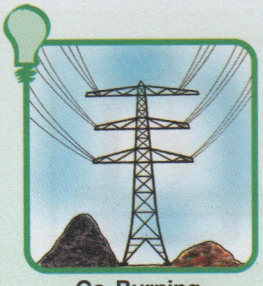

Co-Burning
Hydrocarbon wastes are used to supplement a fuel such as coal to produce energy. The blended fuel can be burned using technology similar to that used for the original fuel source. The exhaust material passes through filters and scrubbers for pollution control.

Excavation
Excavation is the mechanical removal of contaminated soils and sediment using machines like backhoes and dredges. Excavation includes other activities like active dewatering, decanting, and bulk material transportation.

Incine
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Criteria	
Environmentally Sound	
Reduce Detrimental Effect on the Environment	B
Enhance Long Term Effectiveness and Permanence	A
Improve Land and Marine Ecosystem	A
Economically Responsible	
More Reliable Technology	B
Cost Effectiveness	C
Use of Local Materials	C
Health Conscious	
Minimize Health Risk	A
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	A
Use of Local Labour	B
Minimize Construction and Cleanup Time	B

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

☐ **Acceptable:** Please explain why?

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OR

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What modification(s) would make this option acceptable?

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If these condition(s) were met, what degree of acceptability would you rate this option?

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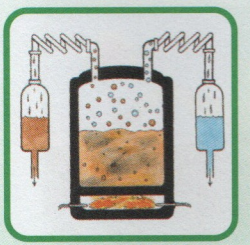

Other Thermal Treatments
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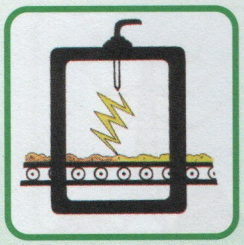

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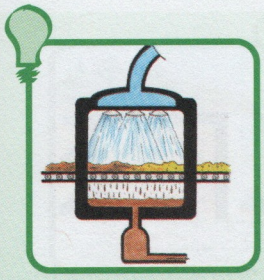

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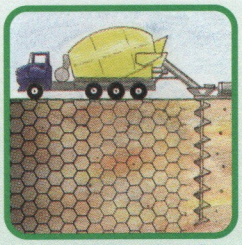

Stabilization & Solidification
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Coke Ovens

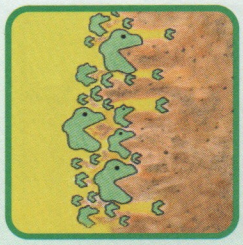
Pyrolysis and Co-burning

This option would excavate the top two metres of soil from contaminated areas and replace it with clean fill. Pyrolysis would separate contaminants from the excavated soil. Fuel material recovered in this manner would go to an offsite power plant or cement kiln for co-burning. The remaining material would go into an engineered landfill on the site.

Underground chambers and tunnels would be removed or filled, and the site would be covered with clean soil and planted with grass.

All four Coke Ovens options would re-route Coke Oven Brook through Mullin's Bank, and all could include an engineered containment area for Tar Ponds sediment

Cost	Duration	Notes	Risk Management
$100-million	7 Years	**Advantages:** Makes good use of local labour and materials; destroys contaminants; recovers energy from co-burning. **Limitations:** May generate dust, vapours and odours during cleanup requiring mitigation measures; may require management of treated materials; requires engineering and health-and-safety controls for future construction and commercial activities.	Eliminates source



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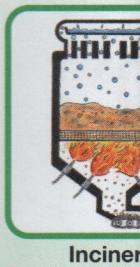

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Improve Land and Marine Ecosystem	A
Economically Responsible	
More Reliable Technology	A
Cost Effectiveness	B
Use of Local Materials	C
Health Conscious	
Minimize Health Risk	A
Minimize Amount of Dust and Vapours	C
Minimize Odours	C
Socially Acceptable	
Maximize Long Term Benefits	A
Use of Local Labour	B
Minimize Construction and Cleanup Time	C

Questionnaire

Please check and fill in only one of the three responses.

Is this option?

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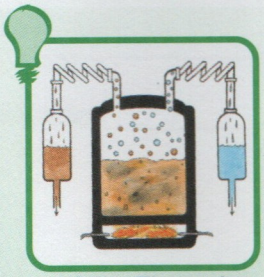

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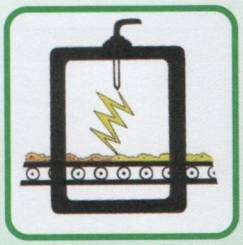

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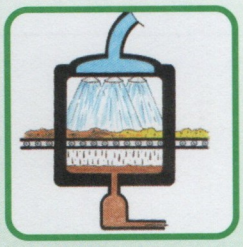

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Stabilization & Solidification
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Next Steps

Environmental Assessment (EA)

EA is a process that is used to identify, analyze, and evaluate the environmental effects of proposed projects. It is a tool to help achieve the goal of sustainable development and it involves the public in a participatory manner.

A Project for the cleanup will be defined after government has made a decision about JAG's recommendation. The EA will be carried out by appropriate government departments on the defined Project. The time to complete an EA can vary depending on factors such as the level of assessment and the availability of required information.

For more information on the federal environmental assessment process visit http://www.acee-ceaa.gc.ca/ or call 902-426-0564.

For information on the provincial environmental assessment process contact 902-424-2574 or visit http://www.gov.ns.ca/enla/ess/ea/

Project Implementation

Once the EA process is complete, the project can move forward to the implementation phase.

How do you think the public should be informed or be involved during The Big Cleanup?

_____

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General Comments

Final Comments?

The Cleanup Trail

JAG
JOINT ACTION GROUP

For Environmental Clean-Up Of The Muggah Creek Watershed

320 Esplanade, Sydney, Nova Scotia B1P 7B9
Phone (902) 563-5584 • Fax (902) 563-5240
www.muggah.org
www.muggah4kids.org